

What is claimed is:

1. A signal output apparatus comprising  
an output amplifier to amplify input signals to output signals, and  
5 a distortion canceller coupled to an input of the output amplifier,  
wherein harmonic distortions appear in said output amplifier and said distortion  
canceller, and  
said harmonic distortions from said output amplifier and those from said  
distortion canceller are created in an opposing manner such that cancellation occurs.  
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2. The signal output apparatus according to claim 1 wherein said output amplifier  
and said distortion canceller have substantially the same threshold voltage at which  
distortions appear.
- 15 3. The signal output apparatus according to claim 1 wherein said distortion canceller  
includes an amplifier circuit.
4. The signal output apparatus according to claim 3 wherein said distortion canceller  
has almost no influences on outputs of the signal output apparatus in a low voltage range  
20 and increases an amplitude of said distortion canceller in a medium voltage range.
5. The signal output apparatus according to claim 4 wherein due to the influences of  
said distortion canceller, a relationship between input signals and final outputs of said  
signal output apparatus becomes closer to a proportional relationship than that without  
25 any influence of said distortion canceller.
6. The signal output apparatus according to claim 3 wherein a gain of said distortion  
canceller is approximately 1 in the low voltage range.
- 30 7. The signal output apparatus according to claim 3 wherein said output amplifier  
and said distortion canceller employ a different type of amplifier circuit from one another.

8. The signal output apparatus according to claim 3 wherein said output amplifier employs a type of amplifier circuit in which high voltage output properties are superior to those of said distortion canceller.

5 9. The signal output apparatus according to claim 3 wherein said distortion canceller has a smaller power consumption than that of said output amplifier.

10. The signal output apparatus according to claim 3 wherein said output amplifier includes a differential amplifier.

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11. The signal output apparatus according to claim 3,  
wherein said output amplifier has a first transistor which is coupled between a power supply line and a ground line, a second transistor which is coupled in parallel to said first transistor between the power supply line and the ground line, and a first resistor  
15 which is coupled between said first and second transistors and the ground line, and

wherein said distortion canceller has a third transistor whose collector is coupled to the power supply line and whose emitter is coupled to a second resistor, and a fourth transistor whose collector is coupled to the power supply line and whose emitter is coupled to a third resistor, whereas an end of the second and third resistor which are  
20 opposite to the second and third transistors are coupled to one another, and the point of coupling is coupled to the ground line.

12. The signal output apparatus according to claim 11 wherein each of the first to fourth transistors comprises a plurality of transistors, wherein the number of transistors  
25 comprising the first and second transistors is larger than the number of transistors comprising the third and fourth transistors.

13. The signal output apparatus according to claim 12 wherein  
a fifth transistor is coupled between the first transistor and the ground line,  
30 a sixth transistor is coupled between the second transistor and the ground line, and  
said point of coupling between second and third transistors is coupled to the ground line via a seventh transistor.

14. The signal output apparatus according to claim 13 wherein each of the fifth to seventh transistors comprises a plurality of transistors, wherein the number of transistors comprising the fifth and sixth transistors is larger than the number of transistors comprising the seventh transistor.

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15. The signal output apparatus according to claim 1 wherein a current amplifier to amplify a current without amplifying a voltage is coupled to an input end of said output amplifier, and said distortion canceller is coupled to said current amplifier.

10 16. The signal output apparatus according to claim 3 wherein among circuit elements which comprise said output amplifier and said distortion canceller, the product of a collector current through a transistor connected to the ground line and a resistance value of a resistor connected to the ground line through the transistor is substantially equal in said output amplifier and said distortion canceller.

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17. A data transmission device including said signal output apparatus according to claim 1.

18. A signal output apparatus which multiplies the amplitude of an input signal by a predetermined factor and outputs it as an output signal and

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which has an output amplifier and a pre-amplifier,  
wherein

said output amplifier has output properties  
in which its output has a relationship proportional to an input when the input  
25 signal is in a low voltage range,

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in which its output deviates from the relationship proportional to an input when the input signal is in a medium voltage range, and

in which its output voltage hardly increases or does not increase at all when the input signal is in a high voltage range, and

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wherein

said pre-amplifier has output properties

in which its output has a relationship proportional to an input when an input signal is in said low voltage range, and

in which its output deviates from the relationship proportional to an input into an opposite manner to the deviation of said output amplifier when the input signal is in said medium voltage range.

5 19. The signal output apparatus according to claim 18 wherein said output amplifier and said pre-amplifier have substantially the same threshold voltage at which deviations appear.

10 20. The signal output apparatus according to claim 18 wherein said pre-amplifier includes an amplifier circuit.

21. The signal output apparatus according to claim 20 wherein said pre-amplifier has almost no influences on outputs of the signal output apparatus in a low voltage range and increases an amplitude of said distortion canceller in a medium voltage range.

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22. The signal output apparatus according to claim 20 wherein due to the influences of said pre-amplifier, a relationship between input signals and final outputs of said signal output apparatus becomes closer to a proportional relationship than that without any influence of said pre-amplifier.

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23. The signal output apparatus according to claim 20 wherein a gain of said pre-amplifier is approximately 1 in the low voltage range.

24. The signal output apparatus according to claim 20 wherein said output amplifier and said pre-amplifier employ a different type of amplifier circuit from one another.

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25. The signal output apparatus according to claim 20 wherein said output amplifier employs a type of amplifier circuit in which high voltage output properties are superior to those of said pre-amplifier.

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26. The signal output apparatus according to claim 20 wherein said pre-amplifier has a smaller power consumption than that of said output amplifier.

27. The signal output apparatus according to claim 20 wherein said output amplifier includes a differential amplifier.

28. A data transmission device including said signal output apparatus according to  
5 claim18.

29. A signal output apparatus which multiplies the amplitude of an input signal by a predetermined factor and outputs it as an output signal and  
which has an output amplifier and a pre-amplifier,  
10 wherein said output amplifier has output properties  
in which its output has a relationship proportional to an input when an input signal is in a low voltage range,  
in which its output becomes lower than the relationship proportional to the input represents when the input signal is in a medium voltage range, and  
15 in which its output voltage hardly increases or does not increase at all when the input signal is in a high voltage range,  
said pre-amplifier supplies said input signal without being amplified to said output amplifier when the input signal is in said low voltage range, and amplifies by a predetermined gain and supplies to said output amplifier when the input signal is in said  
20 medium voltage range.

30. The signal output apparatus according to claim 29 wherein said output amplifier and said pre-amplifier have substantially the same threshold voltage at which deviations appear.  
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31. The signal output apparatus according to claim 29 wherein said pre-amplifier includes an amplifier circuit.

32. The signal output apparatus according to claim 31 wherein said pre-amplifier has  
30 almost no influences on outputs of the signal output apparatus in a low voltage range and increases an amplitude of said distortion canceller in a medium voltage range.

33. The signal output apparatus according to claim 31 wherein due to the influences of said pre-amplifier, a relationship between input signals and final outputs of said signal output apparatus becomes closer to a proportional relationship than that without any influence of said pre-amplifier.

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34. The signal output apparatus according to claim 31 wherein a gain of said pre-amplifier is approximately 1 in the low voltage range.

35. The signal output apparatus according to claim 31 wherein said output amplifier and said pre-amplifier employ a different type of amplifier circuit from one another.

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36. The signal output apparatus according to claim 31 wherein said output amplifier employs a type of amplifier circuit in which high voltage output properties are superior to those of said pre-amplifier.

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37. The signal output apparatus according to claim 31 wherein said pre-amplifier has a smaller power consumption than that of said output amplifier.

38. The signal output apparatus according to claim 31 wherein said output amplifier includes a differential amplifier.

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39. A data transmission device including said signal output apparatus according to claim 29.